

associated with the evoked response is sensed between the ventricular ring electrode and the electrically conductive housing of the cardiac pacing system.

33(Amended). The cardiac pacing system as recited in claim 19, further including an electrically conductive housing that contains the pacing circuit and sensing circuit, wherein the signal associated with the evoked response is sensed between the ventricular tip electrode and the electrically conductive housing of the cardiac pacing system.

REMARKS

In accordance with the above amendments, claims 1 and 19 have been rewritten and claims 2 and 20 have been canceled. Thus, claims 1, 3-19 and 21-36 remain under consideration in the present application. No claim has been allowed.

It is believed that the claims as amended clearly distinguish over the applied references. Note that the Haefner et al '683 reference fails to recognize the versatility and scope of combination of sensing electrodes employed in accordance with the various embodiments disclosed in the present invention. That reference does not contemplate the multiple combinations of electrodes for use in unipolar or bipolar sensing. Likewise, neither Zhu et al reference recognize either the use of unipolar or bipolar sensing between many different combinations of

electrodes or the use of multiple independent blanking switches in the context of the present invention.

Since it is believed that the current claims clearly distinguish over the art, taken either singularly or in combination and either from the viewpoint of anticipation or obviousness, the Examiner is requested to reconsider his position and withdraw his rejection based on the present claims.

Respectfully submitted,

NIKOLAI & MERSEREAU, P.A.



C. G. Mersereau
Registration No. 26,205
820 International Centre
900 Second Avenue So.
Minneapolis, MN 55402
(612) 339-7461

CERTIFICATE OF MAILING

I hereby certify that the foregoing Amendment in response to the Official Action of January 25, 2002, together with a Petition for a three-month extension of time, and a Transmittal Letter, in application Serial No. 09/206,329, filed on December 8, 1998, of Geng Zhang et al, entitled "AUTOCAPTURE PACING/SENSING CONFIGURATION" is being deposited with the U.S. Postal Service as First Class mail in an envelope addressed to Commissioner of Patents and Trademarks, Washington, D.C. 20231, postage prepaid, on July 25, 2002.



Barbara L. Davis
on behalf of C. G. Mersereau
Attorney for Applicant

Date of Signature: July 25, 2002

Marked-up Version of Claims Being Amended

Please rewrite claims 1 and 19 as follows:

1. (Four Times Amended) A cardiac pacing system for use with unipolar or bipolar atrial and ventricular pacing and sensing leads, said cardiac pacing system including:

- (a) an atrial lead having atrial electrodes comprising an atrial tip electrode and an atrial ring electrode electrically coupled thereto;
- (b) a ventricular lead having ventricular electrodes comprising a ventricular tip electrode and a ventricular ring electrode electrically coupled thereto;
- (c) pacing means for providing a pacing stimulus to at least one of an atrium or ventricle of a heart, said pacing means electrically coupled to at least one of said atrial lead and said ventricular lead;
- (d) sensing means for sensing a response evoked by the pacing stimulus, said sensing means electrically coupled to at least one of said atrial lead and said ventricular lead said sensing means including multiple independent blanking switches corresponding to independent electrodes, wherein a signal associated with the evoked response is sensed between at least one of said atrial electrodes and said ventricular electrodes; [and]
- (e) an indifferent electrode and a can that contains the

pacing and sensing means, said indifferent electrode
being positioned on the can;

(f) afterpotential attenuation means for attenuating afterpotentials which result due to the application of the pacing stimulus to the heart by said cardiac pacing system, said afterpotential attenuation means being electrically coupled to said pacing means and having a reduced coupling capacitance of less than 5 microfarads;
and

(g) wherein the evoked response is sensed between two of said
electrodes.

3(Twice Amended). The cardiac pacing system as recited in claim [2] 1 wherein the signal associated with the evoked response is sensed between the atrial tip electrode and the indifferent electrode.

4(Amended). The cardiac pacing system as recited in claim [2] 1, wherein the signal associated with the evoked response is sensed between the ventricular ring electrode and the ventricular tip electrode.

5(Twice Amended). The cardiac pacing system as recited in claim [2] 1, [further including an indifferent electrode and a can that contains the pacing and sensing means, said indifferent electrode is positioned on the can,] wherein the signal associated with the evoked response is sensed between the atrial ring electrode and the indifferent electrode.

6(Twice Amended). The cardiac pacing system as recited in claim [2] 1, [further including an indifferent electrode and a can that contains the pacing and sensing means, said indifferent electrode is positioned on the can,] wherein the signal associated with the evoked response is sensed between the ventricular tip electrode and the indifferent electrode.

7(Twice Amended). The cardiac pacing system as recited in claim [2] 1, [further including an indifferent electrode and a can that contains the pacing and sensing means, said indifferent electrode is positioned on the can,] wherein the signal associated with the evoked response is sensed between the ventricular ring electrode and the indifferent electrode positioned on a can of the cardiac pacer and electrically coupled to the cardiac pacer.

8(Twice Amended). The cardiac pacing system as recited in claim [2] 1, wherein the signal associated with the evoked response is sensed between the atrial ring electrode and one of the ventricular electrodes.

9(Twice Amended). The cardiac pacing system as recited in claim [2] 1, wherein the signal associated with the evoked response is sensed between the atrial tip electrode and one of the ventricular electrodes.

10(Twice Amended). The cardiac pacing system as recited in claim [2] 1, wherein the signal associated with the evoked response is sensed between the ventricular ring electrode and the atrial tip electrode.

11(Twice Amended). The cardiac pacing system as recited in claim [2] 1, [further including an electrically conductive housing that contains the pacing and sensing means,] wherein the signal associated with the evoked response is sensed between the atrial tip electrode and the electrically conductive housing of the cardiac pacing system.

12(Twice Amended). The cardiac pacing system as recited in claim [2] 1, further including an electrically conductive housing that contains the pacing and sensing means, wherein the signal associated with the evoked response is sensed between the atrial ring electrode and the electrically conductive housing of the cardiac pacing system.

14(Twice Amended). The cardiac pacing system as recited in claim [2] 1, further including an electrically conductive housing that contains the pacing and sensing means, wherein the signal associated with the evoked response is sensed between the ventricular ring electrode and the electrically conductive housing of the cardiac pacing system.

15(Twice Amended). The cardiac pacing system as recited in claim [2] 1, further including an electrically conductive housing that contains the pacing and sensing means, wherein the signal associated with the evoked response is sensed between the ventricular tip electrode and the electrically conductive housing of the cardiac pacing system.

19. (Three Times Amended) A cardiac pacing system for use

with unipolar or bipolar atrial and ventricular pacing and sensing leads, said cardiac pacing system including:

- (a) an atrial lead having atrial electrodes comprising an atrial tip electrode and an atrial ring electrode electrically coupled thereto;
- (b) a ventricular lead having ventricular electrodes comprising a ventricular tip electrode and a ventricular ring electrode electrically coupled thereto;
- (c) a pacing circuit including a pacing charge storage capacitor that provides a pacing stimulus to at least one of an atrium or ventricle of a heart, said pacing circuit electrically coupled to at least one of said atrial lead and said ventricular lead;
- (d) a sensing circuit that senses a response evoked by the pacing stimulus, said sensing circuit electrically coupled to at least one of said atrial lead and said ventricular lead, said sensing circuit including multiple independent blanking switches corresponding to
[independent electrodes, wherein a signal associated with
the evoked response is sensed between at least one of
said atrial electrodes and said ventricular electrodes;
[and]] *or*
- (e) an indifferent electrode and a can that contains the pacing and sensing means, said indifferent electrode being positioned on the can;

- (f) coupling capacitors electrically coupled together wherein a capacitance of the capacitors coupled together has a combined reduced capacitance of less than 5 microfarads wherein the combined reduced capacitance of less than 5 microfarads attenuates afterpotentials which result due to the application of the pacing stimulus to the heart by said cardiac pacing system, said capacitors being electrically coupled to said pacing circuit; and
- (g) wherein the evoked response is sensed between two of said electrodes.

21(Amended). The cardiac pacing system as recited in claim

20 further including an indifferent electrode and a can that contains the pacing circuit and sensing circuit, said indifferent electrode is positioned on the can, wherein the signal associated with the evoked response is sensed between the atrial tip electrode and the indifferent electrode.

22(Amended). The cardiac pacing system as recited in claim [20] 19, wherein the signal associated with the evoked response is sensed between the ventricular ring electrode and the ventricular tip electrode.

23(Amended). The cardiac pacing system as recited in claim [20] 19, [further including an indifferent electrode and a can that contains the pacing and sensing means, said indifferent electrode is positioned on the can,] wherein the signal associated with the

evoked response is sensed between the atrial ring electrode and the indifferent electrode.

24 (Amended). The cardiac pacing system as recited in claim [20] 19, [further including an indifferent electrode and a can that contains the pacing circuit and sensing circuit, said indifferent electrode is positioned on the can,] wherein the signal associated with the evoked response is sensed between the ventricular tip electrode and the indifferent electrode.

25 (Amended). The cardiac pacing system as recited in claim [20] 19, [further including an indifferent electrode and a can that contains the pacing circuit and sensing circuit, said indifferent electrode is positioned on the can,] wherein the signal associated with the evoked response is sensed between the ventricular ring electrode and the indifferent electrode.

26 (Amended). The cardiac pacing system as recited in claim [20] 19, wherein the signal associated with the evoked response is sensed between the atrial ring electrode and one of the ventricular electrodes.

27 (Amended). The cardiac pacing system as recited in claim [20] 19, wherein the signal associated with the evoked response is sensed between the atrial tip electrode and one of the ventricular electrodes.

28 (Amended). The cardiac pacing system as recited in claim [20] 19, wherein the signal associated with the evoked response is sensed between the ventricular ring electrode and the atrial tip

electrode.

29(Amended). The cardiac pacing system as recited in claim [20] 19, further including an electrically conductive housing that contains the pacing circuit and sensing circuit, wherein the signal associated with the evoked response is sensed between the atrial tip electrode and the electrically conductive housing of the cardiac pacing system.

30(Amended). The cardiac pacing system as recited in claim [20] 19, further including an electrically conductive housing that contains the pacing and sensing means, wherein the signal associated with the evoked response is sensed between the atrial ring electrode and the electrically conductive housing of the cardiac pacing system.

31(Amended). The cardiac pacing system as recited in claim [20] 19, wherein the signal associated with the evoked response is sensed between the atrial ring electrode and ventricular tip electrode.

32(Amended). The cardiac pacing system as recited in claim [20] 19, further including an electrically conductive housing that contains the pacing circuit and sensing circuit, wherein the signal associated with the evoked response is sensed between the ventricular ring electrode and the electrically conductive housing of the cardiac pacing system.

33(Amended). The cardiac pacing system as recited in claim [20] 19, further including an electrically conductive housing

that contains the pacing circuit and sensing circuit, wherein the signal associated with the evoked response is sensed between the ventricular tip electrode and the electrically conductive housing of the cardiac pacing system.